

CLAIMS

1. A process for producing hexafluoroethane, comprising a step of distilling a crude hexafluoroethane containing chlorine compounds each having two carbon
5 atoms to distill out hexafluoroethane as a top flow from the top of a distillation column and separate a hexafluoroethane mixture containing said chlorine compounds as a bottom flow from the bottom of the distillation column, and a step of contacting said bottom
10 flow with hydrogen fluoride in the gas phase at a temperature of 300 to 500°C in the presence of a fluorination catalyst to fluorinate said chlorine compounds.

2. A process for producing hexafluoroethane, comprising (I) a step of producing a crude
15 hexafluoroethane containing chlorine compounds each having two carbon atoms, (II) a step of distilling said crude hexafluoroethane to distill out hexafluoroethane as a top flow from the top of a distillation column and
20 separate a hexafluoroethane mixture containing said chlorine compounds as a bottom flow from the bottom of the distillation column, and (III) a step of contacting said bottom flow with hydrogen fluoride in the gas phase at a temperature of 300 to 500°C in the presence of a
25 fluorination catalyst to fluorinate said chlorine compounds.

3. The process for producing hexafluoroethane as claimed in claim 1 or 2, wherein the chlorine compound having two carbon atoms contained in said crude
30 hexafluoroethane is at least one compound selected from the group consisting of dichlorotetrafluoroethane, chloropentafluoroethane, 1-chloro-2,2,2-trifluoroethane, 1,1-dichloro-2,2,2-trifluoroethane and 1-chloro-1,2,2,2-tetrafluoroethane.

35 4. The process for producing hexafluoroethane as claimed in any one of claims 1 to 3, wherein the top flow contains at least 80 vol% of the hexafluoroethane

introduced into the distillation column.

5 5. The process for producing hexafluoroethane as
 claimed in any one of claims 1 to 4, wherein said
 fluorination catalyst is a supported or bulk catalyst
 comprising a trivalent chromium oxide as the main
 component.

10 6. The process for producing hexafluoroethane as
 claimed in any one of claims 1 to 5, wherein the molar
 ratio of the hydrogen fluoride to the hexafluoroethane
 mixture contained in said bottom flow (hydrogen
 fluoride/hexafluoroethane mixture) is from 0.05 to 10.

15 7. The process for producing hexafluoroethane as
 claimed in any one of claims 1 to 6, wherein the
 concentration of said chlorine compounds contained in
 said hexafluoroethane mixture is 1 vol% or less.

20 8. The process for producing hexafluoroethane as
 claimed in any one of claims 1 to 7, wherein said crude
 hexafluoroethane is a gas obtained by reacting
 dichlorotetrafluoroethane and/or chloropentafluoroethane
 with hydrogen fluoride in the gas phase in the presence
 of a fluorination catalyst.

25 9. The process for producing hexafluoroethane as
 claimed in any one of claims 1 to 7, wherein said crude
 hexafluoroethane is a gas obtained by reacting 1,1,1,2-
 tetrafluoroethane and/or pentafluoroethane, containing
 the chlorine compounds as impurities, with a fluorine
 gas.

30 10. The process for producing hexafluoroethane as
 claimed in claim 9, wherein the reaction with the
 fluorine gas is carried out in a gas phase in the
 presence of a diluent gas.

35 11. The process for producing hexafluoroethane as
 claimed in claim 10, wherein the diluent gas is a gas
 containing at least one of tetrafluoromethane,
 hexafluoroethane, octafluoropropane and hydrogen
 fluoride.

12. The process for producing hexafluoroethane as

claimed in claim 10 or 11, wherein the diluent gas is a gas rich in hydrogen fluoride.

13. The process for producing hexafluoroethane as claimed in any one of claims 9 to 12, wherein the
5 reaction with the fluorine gas is carried out at a temperature of 250 to 500°C.

14. The process for producing hexafluoroethane as claimed in any one of claims 9 to 13, wherein the
10 concentration of 1,1,1,2-tetrafluoroethane at the inlet of a reactor is 4 mol% or less in the reaction with the fluorine gas.

15. The process for producing hexafluoroethane as claimed in any one of claims 9 to 13, wherein the
15 concentration of pentafluoroethane at the inlet of a reactor is 6 mol% or less in the reaction with the fluorine gas.

16. The process for producing hexafluoroethane as claimed in any one of claims 9 to 15, wherein the
20 reaction with the fluorine gas is carried out under a pressure of 0 to 3 MPa.

17. The process for producing hexafluoroethane as claimed in any one of claims 2 to 16, wherein after
removing acidic components from the gas obtained through said step (III), at least a part of said gas is re-
25 circulated to the step (I) and/or the step (II).

18. A hexafluoroethane product comprising hexafluoroethane obtained by the production process
claimed in any one of claims 1 to 17, in which the
content of chlorine compounds each having two carbon
30 atoms contained in the hexafluoroethane is 1 vol ppm or less.

19. A cleaning gas comprising the hexafluoroethane product claimed in claim 18.